



## HOLDER OF PHOTOMASK

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention:

The present invention provides an apparatus comprising a  
5 photomask ~~of holder of photomask~~ for holding a the photomask,  
which is placed in the transfer box and ~~to be exposed by projecting~~  
~~optical light during~~ is suitable for photolithography process of  
~~manufacturing semiconductor.~~ The photomask is disposed on the  
By ~~means of the~~ long cambered surface of the protrusion disposed  
10 in the photomask holder ~~to uphold photo mask, it prevents so that~~  
the friction between the protrusions and the protrusion from  
~~friction that with the Chromium (Cr) deposition~~ formed on the  
bottom surface of the photomask can be effectively prevented.  
~~therein in consequence of not creating any dust particle.~~ Thus,  
15 generation of particulates can be effectively prevented.

#### 2. Description of the Related Art:

Heretofore, a conventional holder 10 of a the photomask  
201 (as illustrated in Fig. 1 & 2) is placed in a base 20 of a the  
transfer box. The holder 10 is U-shaped and comprises  
20 pluralities of ~~with several~~ falciform members 101 and ~~several~~  
protrusions 102. The holder 10 is made of ~~plasties in~~ plastic  
material and is formed as a one-piece structure via injection  
molding process ~~by eject forming~~, and the protrusion 102 is

adopted ~~rendered~~ to support the uphold photomask 201. As the surface contact ~~contacting~~ area ~~of top~~ of the protrusion 102 with ~~photo-mask~~ the photomask 201 is rather large and ~~in plastics~~ ~~constitution~~ since the protrusion 102 is made of a plastic material,

5 the protrusion 102 is not strong enough to resist friction with the photomask 201 ~~featured with attrition resisting and high hardness.~~

Frequently, ~~owing to~~ during inspection, ~~the manipulating in~~ ~~movement and reposition as well as pick and place of~~ position of the photomask 201 on holder 10 is adjusted or lifted-off and

10 placed back on the holder 10 ~~in process operation,~~ and the protrusion 102 will be subjected to ~~is subject to~~ friction with the photomask 201 with Chromium (Cr) deposition formed on the bottom surface of the photomask 201 ~~protrusion 102~~, which serves ~~served~~ as a circuit protecting shroud layer, and ~~results in creating~~

15 thereby generate particulates ~~dust particle.~~ Wherein the Chromium (Cr) deposition on the bottom surface of the photomask 201 is ~~extremely precise circuit protecting shroud layer so joint~~ jointed with a jacket membrane 201a to protect the photomask 201 from stop the dust, which would otherwise adversely affect

20 ~~particle off~~ the focus of the photomask 201. If the surface of the jacket membrane 201a is adhered with a lot of dust or particulates ~~particle abundantly~~, the jacket membrane 201a must be replaced in order to prevent the wafer from failure in inaccurate exposure.

However, the ~~unit price~~ cost of the jacket membrane 201a is high  
and therefore the overall cost is increased ~~expensive~~ so that  
~~drawback in cost increasing due to step up the replacement~~  
~~frequency of jacket membrane 201a as failure in reducing the~~  
5 ~~possibility of friction. That friction occurs between the holder~~  
~~10 and the photomask 201 in consequence of causing dust particle.~~

Furthermore ~~as shown in~~ Fig. 1, 2 and 3 respectively, those  
are a perspective view, a front sectional view and a testing  
waveform chart of ~~photo-mask~~ the photomask holder. The friction  
10 between the protrusion 101 and the photomask 201, it would make  
~~the protrusion 101 have been wearied and abraded to cause dust~~  
~~particle generate particulates, then the dust particle creates the~~  
~~unbalance and unflatness thus~~ the surface of the photomask 201 on  
the surface of the protrusion 101 is rendered uneven. Thus, it is  
15 essential to ~~neecessitate the~~ repeatedly adjusting the ~~coordinating~~  
position of sucking disk to correspond with the photomask 201 to  
~~let~~ allow the robotic arm use sucking disk to properly hold and  
adjust the position of ~~attract~~ the photomask 201 ~~suecessfully and~~  
~~movement in~~ the clean room. If the ~~coordinating~~ position of the  
20 sucking disk of the robotic arm is not adjusted properly ~~with the~~  
~~photomask 201 is not well adjusted, the~~ robotic arm sucking disk  
cannot suck move the photomask 201 to move, ~~and after a certain~~  
~~period of inspecting~~ During the inspection process, ~~it can be seen~~

that the ~~seriously unbalanced situation of the~~ protrusion 101 may  
get seriously damaged to produce the particulates dust particle  
~~created~~ generated due to the abrasion of ~~by abrading~~ the protrusion  
101. And, the testing waveform chart presents some pulsations  
5 with ~~in~~ big amplitudes and affects ~~to retard~~ the movement ~~in~~  
~~process of~~ the photomask 201.

Moreover, the transfer box is ~~functioned~~ adopted to protect  
the photomask 201 from dust in order to ensure that the photomask  
201 is clean. ~~cleanness within be better than that outside.~~ So, the  
10 ~~less the dust particle be caused inside, the better is the function.~~  
~~Owing to the current contrived structure, the transfer box is~~  
~~suffered from dust particle of attrition mentioned above.~~ Thus, it  
~~creates~~ this increase the cost ~~escalation~~ and incurs extra labor  
~~work~~ attributed to periodic cleansing regularly.

## 15 SUMMARY OF THE INVENTION

The present invention has been accomplished under the  
circumstances in view. The ~~compound~~ material with high  
hardness ~~and attrition resisting~~ has been tried. Although the  
~~compound~~ material may ~~can be able to~~ prevent generation of  
20 particulates from causing dust particle in due to friction, but its  
brittleness is not adequate. Therefore, the ~~good enough to form~~  
falciform member ~~101~~ of the holder ~~10~~ formed through injection  
molding process or extrusion process is cracked ~~one piece ejecting~~

forming. It is highly ~~greatly possible to be cracked and damaged~~  
due to shaking ~~shake and crush~~ of the photomask 201. Besides,  
its cost is rather expensive. Accordingly ~~From consequence of~~  
~~further experiment, the various materials and adoption of special~~  
5 ~~structure in a variety of structures for protrusion is eventually are~~  
applied to prevent it the protrusion from friction with the  
photomask and thereby prevent generation particulates ~~creating~~  
~~dust particle~~ as well as to reduce the overall cost.

## 10 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1÷ is a perspective view of a conventional photomask  
holder with photomask placed thereon ~~of the conventional~~  
~~invention.~~

Fig. 2÷ is a front sectional view of the photomask holder  
15 with photomask placed thereon shown in Fig. 1 ~~of the~~  
~~conventional invention.~~

Fig. 3÷ is a testing waveform chart in balanced mode of the  
photomask holder ~~of~~ according to a conventional art invention.

Fig. 4÷ is a perspective view of a photomask holder  
20 ~~according to~~ ~~of~~ the present invention.

Fig. 5÷ is a front sectional view of the photomask holder  
according to ~~of~~ the present invention.

Fig. 6÷ is an exploded perspective view of the photomask

holder ~~in~~ according to the preferred embodiment of the present invention.

Fig. 7 is a testing waveform chart in balanced mode of the photomask holder of the present invention.

## 5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

~~Referring to fig~~Fig. 4 and 5, ~~which~~ are a perspective view and a front sectional view of the photomask holder of the present invention, respectively. A protrusion 40, ~~is made of~~ from PEEK ~~and or~~ VESPEL material ~~with having~~ attrition resistance ~~resisting~~ and high hardness is provided. One ~~the~~ side of the protrusion 40 ~~is shaped in inclination~~ inclined to form a toward center with the ~~top in~~ long cambered surface as supporting ridge 41. And, at distal end far away from ~~of~~ the supporting ridge 41, a pedestal 40a ~~is disposed given to detachably connect with a holder 50 jointly~~ integrate with via a through hole 50a of the a holder 50 so that the protrusion 40 is positioned on the holder 50 and a ~~the~~ photomask 201 can be placed on the supporting ridge ~~portion~~ 41 of the protrusion 40 thereon. Thus, by means of the supporting ridge 41 with the long cambered surface of the protrusion 40, the ~~to uphold~~ photomask 201 is positioned thereon, therefore, the contacting surface contact area between the photomask 201 and the holder 50 is reduced, and the friction there-between is reduced. Moreover, the protrusion 40 with the ~~characteristics of~~ attrition resistance

resisting and high hardness would enable the protrusion 40 to  
prevent the protrusion 40 from friction with the Chromium (Cr)  
deposition formed on the bottom surface of the photomask 201 and  
generation of particulates can be effectively reduced therein in  
5 consequence of not creating any dust particle.

Wherein, the shape of pedestal 40a (refer to Fig. 4 and 6)  
at the distal end far away from of the supporting ridge 41 on the  
protrusion 40 can ~~be adapted~~ correspond to ~~match~~ the structure of  
the through hole 50a on the holder 50. Or, the protrusion 40 can  
10 also be constructed without pedestal 40a ~~to~~ and directly adhered to  
the protrusions 40 on the surface of the holder 50.

~~Further referring to fig~~Fig. 5, 6 and 7, which are a frontal  
sectional view, an exploded perspective view and a testing  
waveform chart in balanced mode of the photomask mask-holder of  
15 the present invention, respectively. The protrusion 40, is made of  
~~from~~ material with attrition resistance ~~resisting~~ and high hardness  
is provided. And, by means of the supporting ridge 41 with the  
long cambered surface of the protrusion 40, the ~~to uphold~~  
photomask 201 is positioned thereon. Thus, ~~it can prevent~~ the  
20 protrusion 40 can be prevented from friction with the bottom side  
of the photomask 201 and generation of particulates can be  
effectively reduced. ~~Then~~ Furthermore, the supporting ridge 41  
of the protrusion 40 is made of hard material ~~to susceptible to~~

causing dust particle and to have a more stability of and is capable  
of properly positioning the photomask 201 on the protrusion 40.  
Thus, it is not necessary to repeated adjust the ~~coordinating~~  
position of sucking disk to correspond with the photomask 201 to  
5 ~~let facilitate the robotic arm use sucking disk to attract~~ move the  
photomask 201 ~~successfully and movement of photomask 201 in~~  
clean room. And, the testing waveform charts of photomask 201  
present pulsations with small amplitudes reflecting a pretty  
balanced and stable condition within limited tolerance limit of  
10 ~~local pulsation in small amplitude.~~ Thus, it proves that the  
protrusion 40 is capable of preventing generation of particulates  
~~creates no dust particle due to suffering from no serious attrition.~~  
Additionally, ~~the by means of~~ protrusion 40 is also capable of  
stably supporting and positioning ~~upholding~~ the photomask 201, it  
15 ~~remain the photomask 201 in manner of better balance and~~  
~~stability without any effect in operation of moving~~ to facilitate the  
robotic arm to move the photomask 201.

Therefore, the protrusion 40 on the holder 50 of the  
present invention is capable of stably supporting ~~can definitely~~  
20 ~~offer the effect in stable disposition of~~ photomask 201, as well as  
prevents the protrusion 40 from generating particulates ~~dust~~  
~~particle caused by~~ due to friction.

Although a particular embodiment of the invention has



described in detail for purpose of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

## ABSTRACT OF THE DISCLOSURE

An apparatus suitable for holding a photomask comprises a photomask holder having a plurality of through holes and a plurality of protrusions detachably connected to the photomask holder via the through holes. The photomask is positioned on supporting ridges of the protrusions so that the friction between the protrusions and the photomask is prevented, and the generation of particulates can be effectively reduced. ~~The present invention relates to an apparatus of holder of photomask for holding the photomask, which is placed in the transfer box and to be exposed by projecting light during process of manufacturing semiconductor, and more particularly to one being able to prevent the photomask from friction with the protrusions therein in consequence of not creating any dust particle. The holder is made of material of PEEK or VESPEL, which is abrasion resisting and high hardness. On the side of the protrusion is shaped in inclination toward center with the top in long cambered surface as supporting ridge. And, at distal end of the supporting ridge, a pedestal is given to jointly integrate with the holder so that the photomask can be placed thereon. Thus, by means of the supporting ridge with the long cambered surface of the protrusion to uphold photo mask, the contacting area of friction is reduced. Moreover, the characteristics of the protrusion is abrasion resisting and high~~

~~hardness prevent from friction with the Chromium (Cr) deposition  
on the bottom surface of the photomask therein in consequence of  
not creating any dust particle.~~